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(19)

(54) TELEPHONE EXTENSION SYSTEM UTILIZING POWER LINE CARRIER SIGNALS

(71) We, WILLIAM M. BROWN, 25 Murphy Road, Hudson, Massachusetts, United States of America; JOHN M. RUDDY, 42 Pantry Road, Sudbury, Massachusetts, United States of America; and ROBERT T. DUNN, 4 Cedar Ridge Drive, Bedford, Massachusetts, United States of America, all citizens of the United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to telephone extension systems providing a portable or mobile extension telephone which communicates over AC power wires. More particularly, the present invention provides apparatus for communicating over AC power wires between an extension telephone and a conventional telephone line.

According to the present invention, there is provided, a power line telephone extension system in a subscriber's premises wired with AC power wires, comprising a subscriber's telephone line entering the premises from a conventional telephone system, the subscribers line including a trip wire and ring wire, a master station coupled to the trip and ring wires and coupled to the power wires by a reactive coupling circuit, and an extension station coupled to an extension telephone and coupled to the power wires, at least one of the said stations being arranged to modulate telephone signals on to a carrier and to couple the modulated carrier into the power wires, and at least the other of the stations being arranged to detect and demodulate the modulated carrier to reconstitute the telephone signals.

The invention will be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a pictorial representation of an extension telephone system including two extension telephones which communicate with a conventional telephone line via available AC power wires and a conventional on line telephone which communicates with the same telephone line;

Figure 2 is an electrical block diagram showing the principal electrical circuits at the master station between the telephone line and the available AC power wires;

Figure 3 is an electrical block diagram showing the principal electrical circuits at one of the extension telephone stations which couple the extension telephone to the AC power wires for communication with the telephone line and the on line telephone;

Figure 4 is a detailed electrical block diagram of the master station transmit-receive unit;

Figure 5 is a diagram showing the sequence of cradle switch, transfer/hold and other signals that initiate coupling of the system to the subscriber's telephone line;

Figure 6 is a detailed electrical block diagram of the extension station transmit-receive unit; and

Figure 7 is a circuit diagram of a conventional battery telephone transmission network of the type used in many conventional telephone handsets and which is for example, the ITT type 75335-1 network, and is suitable for use in the master station transmit-receive unit.

The embodiment of the invention includes one or more extension telephones, each equipped with an extension transmit-receive unit (extension TR unit) enabling the extension phone to couple directly to the available AC power wires, and a master transmit-receive unit (master TR unit) at the master station which connects directly to the available AC power wires and also couples to the telephone line on which there is a conventional on line telephone. This system is illustrated pictorially in Figure 1. The master TR unit serves as an interface between the subscriber's line and the available AC power wires. These power wires act as a transmission medium for the signals on the telephone line and carry these signals to the extension telephone stations and also carry signals from the extension telephone stations to the telephone